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| Project Overviewpage 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Name of Project:** | | | Mouse Trap Vehicles NN | | | | | | | | | | | | | | | | **Duration:** | | | 2 weeks | | | | | | | |
| **Subject/Course:** | | | **Foundations of technology** | | | | | | | **Teacher(s): ASE Academy** | | | | | | | | | **Grade Level:** | | | 9th - 10th Grade | | | | | | | |
| **Other Subject Areas to Be Included:** | | | English I, Physical World Concepts | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Project Idea**  Summary of the issue, challenge, investigation, scenario, or problem: | | | Engineering students are given an opportunity to apply knowledge of the concepts of energy and power by designing and building a mousetrap car. Mousetrap cars are cars that use only the spring potential energy stored in a single mousetrap for power. Student's will observe the transfer of stored spring potential energy into kinetic energy and eventually to dissipation of that energy as a result of non conservative forces. | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Essential Question** | | | How can we transform potential into kinetic energy? | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Content Standards** to be taught and assessed**:** | | | **ELA-** Language, Communication, Writing, Research, Logic, Informational Text, Media and Literature  **Foundations of Tech-** Embedded Inquiry, The conservation of energy, velocity and acceleration. | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  | | | | | | | | | | | **T** | **A** | **E** |  | | | | | | | | | **T** | | | **A** | | | **E** |
| **Professional (21st Century) Skills**to be taught, assessed and/or encouraged**:** | | | Collaboration  group work, team approach to problem solving | | | | | | | |  |  |  | Other: | | | | | | | | |  | | |  | | |  |
| Communication (Oral Presentation)  Oral descriptions of vehicle designs | | | | | | | |  |  |  |  | | | | | | | | |  | | |  | | |  |
| Critical Thinking/Problem Solving  Design and construction of prototypes | | | | | | | |  |  |  |  | | | | | | | | |  | | |  | | |  |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Major Products & Performances** | Group: | | | Design, build, and test a mousetrap-powered vehicle. | | | | | | | | | | | | | | | | **Presentation Audience**   **Presentation Audience:**      Class   School | | | | | | | | | |
|  | Class x | | | | | | | | |
|  | School | | | | | | | | |
|  | Community | | | | | | | | |
| Individual: | | | Research vehicle designs, learn to compute the spring constant, describe the law of conservation of energy. Write a compare-contrast essay on different materials and “spring-motors”. | | | | | | | | | | | | | | | |  | Experts | | | | | | | | |
|  | Web | | | | | | | | |
|  | Other: Partners | | | | | | | | |
| Project Overviewpage 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Entry Event**to  launch inquiry,  engage students: | | Read articles about potential and kinetic energy and Hooke’s Law. | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Assessments** | | **Formative Assessments**  (During Project) | | | | I | | Quizzes/Tets | | | | | | | | G | | Practice Presentations | | | | | |  | | |
| I | | Journal/Learning Log | | | | | | | | G | | Notes | | | | | |  | | |
| G | | Preliminary Plans/Outlines/Prototypes | | | | | | | |  | | Checklists | | | | | |  | | |
| G & I | | Rough Drafts | | | | | | | | G | | Concept Maps | | | | | |  | | |
|  | | Online Tests/Exams | | | | | | | |  | | Other: | | | | | |  | | |
| **Summative Assessments**  (End of Project) | | | | I | | Written Product(s), with rubric: Training Manual  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | | | | | | | I | | Other Product(s) or Performance(s), with  rubric: Compare & Contrast Paper | | | | | |  |
| G | | Oral Presentation, with rubric | | | | | | | | I | | Peer Evaluation | | | | | |  | | |
|  | | Multiple Choice/Short Answer Test | | | | | | | | I | | Self-Evaluation | | | | | |  | | |
|  | | Essay Test | | | | | | | | G | | Other: Built Vehicle | | | | | |  | | |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Resources Needed** | | **On-site people, facilities:** | | | | | | | Engineering Lab, ASE academy | | | | | | | | | | | | | | | | | | | | |
| **Equipment:** | | | | | | | laptops and hand tools | | | | | | | | | | | | | | | | | | | | |
| **Materials:** | | | | | | | 1 Mousetrap  4 Wheels (old CDs or DVDs work well)  2 tubes for axles (these should just fit inside the holes in the CDs)  Superglue  36 inches of string  Scissors  1 small zip tie  2 pieces of balsa wood, 2 ½ inches wide and long enough to extend 1 ½ inches past the front edge of the mousetrap | | | | | | | | | | | | | | | | | | | | |
| **Community resources:** | | | | | | | Vanderbilt University engineering graduate students. | | | | | | | | | | | | | | | | | | | | |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Reflection Methods** | | **(Individual, Group, and/or Whole Class)** | | | x | | Engineering notebooks | | | | | | | |  | | Focus Group | | | | | |  | | | | |  | |
| x | | Whole-Class Discussion | | | | | | | | x | | Fishbowl Discussion | | | | | |  | | | | |  | |
| x | | Survey | | | | | | | | X | | Other: group vehicle assessment | | | | | |  | | | | |  | |